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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/672,010

09/25/2003

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EXAMINER

LIEW, ALEX KOK SOON

ART UNIT

PAPER NUMBER

2624

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/672,010	<b>Applicant(s)</b> SHIBUYA ET AL.	
	<b>Examiner</b> ALEX LIEW	<b>Art Unit</b> 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 October 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10 and 11 is/are allowed.
- 6) ☒ Claim(s) 1-9 and 12-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

The office action is in response to the petition for revival requested on 10/24/07 and was approved on 2/29/08.

### **Response to Applicant's Arguments**

On pages 8 and 9, the applicant stated:

Specifically, the Ikeda Patent is directed to an inspection system and analyzing unit for an image detection *device*. The Examiner asserts that the Ikeda Patent discloses classifying ring/blob regional defects in element 103 of Figure I. Applicants respectfully but strenuously disagrees, As shown and described in connection with Figure I of the Ikeda Patent (reproduced below), element 103 simply shows a generic, round defect image ... Simply stated, element 103 clearly is described as a round defect, and can not reasonably be understood as disclosing a ring blob type defect as recited in the pending claims. The round defect in the Ikeda Patent is depicted by a drawing of a circular object. Moreover, the Ikeda Patent fails to even mention a ring or blob type defect. The undersigned respectfully submits the examiner seems to have misinterpreted Ikeda's drawing of a round defect as being a ring or blob type defect. As such, the combination of the Tobin Patent with the Ikeda Patent does not teach or suggest all the elements of the independent claims.

The examiner disagrees; Ikeda discloses in figure 1, various types of defects that occurs in an image (like a blob, which is an arbitrary shape filled with dark pixels or a ring of dark pixels). Ikeda does not have to state that it is either a blob defect or a ring defect; the various types of defects shown in figure 1 show such features; the examiner also believes that the applicant has heard of "a picture is worth a million words." The arguments presented by the applicant are not persuasive and the examiner will repeat the same rejections.

### **DETAILED ACTION**

#### **Allowable Claims**

Claims 10 and 11 are allowable.

With regards to claim 10, the examiner cannot find applicable prior art and / or suggestion disclosing weighting a point where a perpendicular of arbitrary two defects from the wafer map passes according to the distance between the two defects and voting the point onto the xy space and detecting (x,y) corresponding to the maximum value on the voted space in combination with the rest of the limitations of claim 10.

With regards to claim 11, see the rationale and rejection for claim 10.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 4, 7, 8 and 12 – 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tubin (US pat no 5,982,920) in view of Ikeda (US pat no 7,068,834).

With regards to claim 1, Tubin discloses a defect data analysis method comprising the steps of

obtaining defect positions by inspecting a substrate processed in a process of circuit pattern formation of the substrate (see column 6, lines 41 to 43, computing the statistics of the defects requires the position coordinates of the defects),

obtaining distribution of defects on the processed substrate from the defect position information obtained (see figure 2, 'Distribution statistics' and column, 5 lines 43 to 49) and

classifying the defect distribution characteristics into any one of the following distribution characteristic categories by using the information on the defect position on the processed substrate: repeated defects (see column 5, lines 61 to 64, the plot shows the number of times specify defects are repeated), clustered defects (see column 4, lines 22 to 22), arc-shaped regional defects (see column 4, lines 4 to 6, arc shaped defects are radial shapes), radial regional defects (see column 4, lines 4 to 6), line type regional defects (see column 4, lines 39 to 50, elongated defect forms a line type regional defects) and random defect (see column 3, lines 33 to 34).

But Tubin does not disclose ring / blob type regional defects and displaying classified results by using different colors. Ikeda discloses classifying ring / blob regional defects (see fig 1 – 103) and displaying the classified results by using different colors for respective categories (see figure 11, under 'Classification category').

It would have been obvious to one having ordinary skill in the art at the time of the invention was made to include displaying classified results by using different colors because to allow the operator to easily differential between each classified defect without looking at the defect type image; a single type defect can occur up to hundreds to thousands times, showing the results in color will ease the time needed to correct the defects on the wafer.

Art Unit: 2624

With regards to claim 4, Tubin discloses a defect data analysis method as claimed in claim 1, wherein the defects classified into the arc-shaped regional defects are judged to be scratches generated by chemical and mechanical polishing (see column 4, lines 13 to 16).

With regards to claim 7, see the rationale and rejection for claim 1. In addition, before classifying objects in image to a category, the objects need to be identified first.

With regards to claim 8, Tobin discloses a defect data analysis method as claimed in claim 7, wherein the processing step is realized by displaying the defect information in a wafer map format on the display screen (see figure 1, the image must be display on the computer monitor in order to be printed out).

With regards to claims 12 – 15, see the rationale and rejection for claim 1. In addition, see figure 2 of Tobin for input means, 'Wafermap data'.

3. Claims 2 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tubin (US pat no 5,982,920) in view of Ikeda (US pat no 7,068,834) as applied to claim 1 further in view of Smilansky (US pat no 7,016,526).

With regards to claim 2, Tobin discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference and also

Art Unit: 2624

discloses a defect data analysis method as claimed in claim 1, wherein the arc-shaped regional defects are detected by obtained a center candidate point of the defect distribution from the defect distribution characteristic on the Cartesian coordinates (see column 4, lines 4 to 6, arc shaped defects are radial shapes, the position of the defects are also extracted, column 6, lines 41 to 43, and the distribution is taken in figure 2, 'Distribution statistics'), but fails to disclose extracting the defects from the polar coordinate information. Smilansky discloses extracting the defects from the polar coordinates information on each defect using the center candidate point as an origin (see column 19, lines 27 to 33 and fig 18). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to include extracting the defects from the polar coordinate information because wafers are known to be circular (see Smilansky figure 18, radius and angle), converting data from Cartesian to polar coordinates ease data computations, where best Cartesian coordinate system represents rectangular space (see figure 18, see rectangular grids).

With regards to claim 9, see the rationale and rejection for claim 2.

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tubin (US pat no 5,982,920) in view of Ikeda (US pat no 7,068,834) as applied to claim 1 further in view of Li (US pat no 6,130,959).

Tobin discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose creating distribution data on polar coordinate space from information on the Cartesian space and extracting the radial regional defects from polar coordinate space. Lid discloses creating distribution data on the polar coordinate space according to the information on the Cartesian coordinate space of the objects (see figure 8, shows specimen points in polar coordinate which is converted from the Cartesian coordinate from figure 7) and extracting the radial regional objects from the distribution data on the polar coordinate space (the specimen points are extracted from using reference data points shown in figure 5 and 6).

One skill in the art would extract objects or data information using polar coordinate because wafers are known to be circular converting data from Cartesian to polar coordinates ease data computations and does not require coordinate rotation (see Li column 4, lines 45 to 52).

5. Claims 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tubin (US pat no 5,982,920) in view of Ikeda (US pat no 7,068,834) as applied to claim 1 further in view of Maruo (US pat no 6,408,105).

With regards to claim 3, Tobin discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose perpendicular bisectors of straight lines connecting arbitrary two defects



among the defects distributed on the processed substrate. Maruo discloses center point is extracted as a point having more intersections of perpendicular bisectors of straight lines connecting arbitrary two points (see figure 5, points are P0 and P2). One skill in the art would connect two arbitrary points because to find the distance between individual defects so information is send to the system or operator and have the system or operator perform corrections on the defect to improve quality inspection.

With regards to claim 6, see the rationale and rejection for claim 3. In addition, figure 6 and 7 of Maruo are the polar coordinate transformed space of figure 5.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alex Liew whose telephone number is (571)272-8623. The examiner can normally be reached on 9:30AM - 7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Bella can be reached on (571)272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew C Bella/  
Supervisory Patent Examiner, Art  
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**Alex Liew**  
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**5/28/08**